The final exam is on Thursday 3/19 from 8-11am. It will look something like the following:

1. **True/False**

1. A valid argument can have all false premises.
2. Two statements are contradictory if and only if they are never both true.
3. 'Tom eats the cheese just in case Jerry eats the cheese' expressed a biconditional claim.
4. A disjunction is false when both disjuncts are true.
5. 'If the earth resides on the back of a narwhal, then the earth is in the Milky Way' is TRUE, according to the logician's understanding of the material conditional *if-then*.
6. '(5=4) if and only if (SB is in CA)' is FALSE.
7. All uses of the English 'and' can be captured by the logician's dot.
8. The rule of double negation can only be used on a *whole line* in a derivation.
9. Any argument with a contradiction for a premise is valid.
10. Any argument with a tautology for a conclusion is valid.

...

2. **Translations**

Be sure to include a *scheme of abbreviation*. Do not expect your TA to uncover what you (obviously) had in mind. If there is more than two statements, be sure to indicate this.

1. Eating animals is morally permissible only if animals feel no pain
2. Stephan has the paints but he does not have the motivation.
3. Emma likes the expression 'Matt Damon!' although she is not a big fan of Matt Damon.
4. On the condition that door #1 doe not hide a dirty sock and Choosey believes this, Choosey picks door #2.
5. If Jones is morally responsible for taking the bread, then Jones was free to choose otherwise. But if Jones was hungry, then Jones was not free to choose otherwise. Jones, by the way, was hungry. So Jones is not morally responsible for taking the bread.
6. Slim has neither the soup nor the salad.
7. If it is true that colors exist only if perceivers exist, then colors are mind-dependent.So, it is false that colors are mind-dependent only if colors exist and perceivers do not exist.
8. A necessary condition on Chris knowing that he has hands is that he knows he is not dreaming. Unfortunately, Chris does not know he is not dreaming. Thus he doesn't know he has hands.
9. Either the sun rises tomorrow or I'm not sane. So, if I'm sane then the sun rises tomorrow.

...

3. **Complete Truth Tables.** For the following *arguments*, use the Truth Table method to determine whether the argument is valid. Complete answers will have truth values (T, F) under every logical connective (tilda, dot, arrow etc.) as well as all the possible combinations of truth-value assignments . If the argument is valid, explain why. If the argument is invalid, clearly indicate the specific part of the table that shows this.

1. $\sim(P \vee Q)$, $Q \rightarrow P \vee Q$, P So, $P \rightarrow Q$

2. $\sim[(A \rightarrow B) \bullet \sim A]$, $B \leftrightarrow \sim A$, So, $B \vee (A \rightarrow B)$

3. $X \vee (T \rightarrow C)$, $T \bullet \sim C$, $T \leftrightarrow \sim X$ So, $X \bullet C$

4. **Indirect Truth Tables** For the following *arguments*, use the indirect truth table method to determine whether the argument is valid. Complete answers will have truth values (T, F, or possibly T/F) under every logical connective (tilda, dot, arrow etc.). If the argument is valid, clearly indicate the specific part of the table that shows this. If the argument is invalid, state or indicate explicitly the truth value assignment that makes it so.

1. $R \rightarrow [(Z \bullet R) \vee \sim Z]$, $\sim R \vee Z$, $Z \rightarrow (R \leftrightarrow \sim Z)$ So, $R \leftrightarrow \sim Z$

2. $R \bullet (D \vee J)$, $\sim J$, $D \rightarrow (R \leftrightarrow J)$ So, $(R \bullet J) \vee (\sim R \bullet \sim J)$

3. $L \rightarrow F$, $L \vee F$, $F \bullet (O \vee L)$, So, $\sim[O \leftrightarrow (L \bullet F)]$

5. **Using Truth Tables**: Applications Beyond Validity

A. Single Statements. For the following formal statements, (i) provide the corresponding truth table and (ii) say whether the statement is a *tautology*, a *contradiction*, or *contingent*.

*** problems similar to those in 7.5 A, B p. 341

B. 2 or More Statements. For the following sets of formal statements, (i) provide the corresponding truth table and (ii) say whether the sets of statements are *logically equivalent*, *logically contradictory*, *consistent*, or *inconsistent*.

*** problems similar to those in 7.5 C p. 341

6. **Derivations**. Show the following arguments to be valid by deriving the conclusion using our rules of implication and our rules of equivalence. Be sure to annotate each step you make.

*** problems similar to those in p. 379 C and D
problems similar to those in p. 388-390 C and D